

ORIGINAL

Patent Application of  
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for

Pivoting Frame Suspension Scooter



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**Background--Field of Invention**

This invention relates to motor powered scooters. More particularly a construction of a suspensioned all terrain scooter is disclosed in which a frame supporting a platform for standing rider is supported on a large central tubular member. The central tubular member is pivoted somewhere along its length so that that the frame halves can rotate in respect to each other along the pivot line. Rotation between frame halves is resisted by a shock absorber with either end mounted to respective frame halves. When driving over uneven terrain, the weight of the rider forces down upon the rider's platform which is connected to one or the other halves of the frame. Subsequently the frame halves pivot allowing the platform a downward motion which is absorbed by the shock absorber which is connected to the two frame halves, this suspension system allows the user to transverse uneven terrain with greater comfort, control and safety.

**Background of the Invention**

All terrain motorized scooters are known. Such scooters have been available since December 25, 1996 from Martin Manufacturing of Scottsdale, Arizona under the trade name, Martin Mini. A scooter is disclosed with a steer able front wheel and rear wheel. The front wheel steers and the rear wheel is motor driven. The reader can see and understand that the scooter in Patmont U.S. Patent #4821832 is a rigid frame with no provision other than the flexure of the frame made for suspension, also Patent U.S #6012539 again, no provision is made for suspension. U.S. Patent

U.S. #5388659 also shows a folding motor scooter with no provision made for suspension.

There has arisen a need for a suspension system on small motorized scooters to help make driving over uneven surfaces safer, easier, with greater comfort and speed.

Originally, scooters were made with rigid frames. This made for difficulty in driving over rough terrain, this problem has been partly solved by the implementation of shock absorbing means in the addition of pneumatic tires, but these scooters still had significant problems driving over rough terrain Patent # U.S. 6012539 shows an all terrain scooter with pneumatic tires, this failed to solve the problem of driving over an uneven terrain because the pneumatic tires did not have sufficient shock absorbing capacities. A provision needed to be made in the frame of the scooter to absorb shock. Folding motorcycles and mini bikes, mostly use suspension in their frames to overcome road irregularities. However, due to the simplicity of folding scooters, no one has incorporated shock absorbing frame to absorb road irregularities. Because placement of the motor required close proximity to the rear wheel, swing arms for independent movement of the rear wheel as used in motorcycles was impractical due to the length of the swing arm and forward placement of the motor. By leaving the motor in place over the rear wheel and pivoting the frame, the problem of incorporating suspension is overcome. Although this suspension does not allow the motor to be isolated from road shock, the longer lever arm of the pivoting frame causes less movement to the motor than a short swing arm would, also the operator of the vehicle enjoys the benefits of suspension with the platform from which he rides being suspended and isolated from road irregularities due to the action of the pivoting frame and the shock absorber mounted between the frame halves. By mounting the shock on top of the frame allows for the use of a commonly available shock from the mountain bike industry, this brings

about a cost savings over developing a specialty shock or spring for this application. A more effective suspension is realized due to the pivoting the frame, instead of a short swing arm, because of the longer lever arm that the pivoting frame permits, which allows for the scooter frame to follow larger uneven surfaces better than a shorter swing arm.

### **Objects and Advantages**

There has arisen a need for suspensioned folding portable motor scooters, such vehicles can be utilized to transverse uneven terrain more safely, with greater comfortable to the operator allowing better traction, and safer vehicle control, due to the terrain following characteristics of the pivoting suspension frame.

According, several objects and advantages of my invention are:

- (A.) An improved scooter frame using a shock absorber to isolate road irregularities transmitted to the frame through the wheels which solves the disadvantages of a solid frame in Patent # U.S. 5388659 and also Patent# U.S.48218312 and also Patent#U.S.6012539
- (B.) A lighter weight frame can be incorporated due to the action of the shock to absorb overloads in the frame.
- (C.) The shock absorbing frame can make the scooter safer for operation on uneven terrain, due to the increase in control
- (D.) Traction is improved to the rear wheel due to the action of the shock frame pivoting to follow the terrain.
- (E.) Cornering is improved due to the action of the shock frame pivoting, absorbing force as cornering loads are introduced.
- (F.) Due to the shock location on the frame, sufficient room is afforded to allow a small, high quality, shock such as used in the mountain bike industry.

(G.) By mounting the shock on top of the frame allows for the use of a commonly available shock from the mountain bike industry, this brings about a cost savings over developing a specialty shock or spring for this application.

(F.) A more effective suspensions realized due to the pivoting the frame, instead of a short swing arm, because of the longer lever arm that the pivoting frame permits, which allows for the scooter frame to follow larger uneven surfaces better than a shorter swing arm.

Further objects and advantages of my invention will become apparent from the considering of the drawings and the ensuing description.

#### **Reference Numerals In Drawings**

1 shock	13 fuel tank
2 front frame	14A,B bracket for platform
3 rear frame	15 slide tube
4 front tire	16 spring
5 back tire	17 hinge
6 handle bar	18 steering tube
7 front fork	19 hook latch
8 engine	20 kick stand
9 pivot	21A,B bearing
10 shock mount rear frame	22 drive spindle
11 shock mount front frame	23 clutch
12 riders platform	

## **Operation of Invention**

In Fig.1 the forward frame 2 is connected to the rear half 3 of the frame by a pivot 9. One end of a shock absorbing device 1 is attached to the forward frame 2 by bracket 11. The other end of the shock absorbing device is connected to the rear frame half 3 by a bracket 10.

Fig.2A,B,C Bracket 10 or 11 can have multiple holes spaced apart from each other for receiving the shock absorbing device 1 ends, this allows the user to increase or decrease the shock absorbing ability of the shock absorbing device by increasing or decreasing the leverage force input into the shock end. These spaced holes in the bracket 10 or 11 are placed so that the shock device can be moved from hole to hole without affecting the original orientation of the frame halves to each other. The rider stands on the foot board 12 when operating scooter.

Fig.3 when scooter transverses an uneven surface, the weight of the rider presses down on the foot board 12, foot board 2 is connected to the frame half 2. Since the front wheel 4 holds one end of the scooter upright, the force of the rider's weight is directed toward the pivot 9 in the frame. The rear tire 5 also resists downward movement and directs downward force to the frame pivot 9. Subsequently the frame halves rotate in relation to each other allowing footboard 12 to be displaced downward. The downward displacement is resisted by the shock absorbing device, in this way the suspension system for the rider is accomplished. It will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the amended claims.

## **Description of Invention**

Referring more particularly to the drawings by characters of reference, Fig.1A discloses a motorized suspension scooter having a horizontal elongated board 12, the top surface of which

provides a platform for the feet of the user which board is supported by the structural frame 2 and connected by one or more brackets 14a and 14b. Fig.1. structural frame can be of any material which lends structure and resistant to load inputs, such materials might include tubing, plate, or a combination of such. Fig.4 steering handle 6 is down over and parallel to standing platform. The handle is of a type having a spring biased reciprocating sleeve 15 fitting over a hinge 17 when spring biased reciprocating sleeve 15 over hinge 17 steering handle 6 is maintained vertical. Fig.1B and Fig.4 when spring biased reciprocating sleeve 15 is moved away from hinge 17, steering handle 6 can be bent to the horizontal disposition. The handle bar can be secured at latch 19 in the horizontal position. At the forward end of the frames main structural tube 2 at the forward end of the main structural tube 2 fastens to head tube 18. As is traditional in such head tubes, this tube is substantially vertical having only a slight rake to and towards the rear of the scooter. Such a rake is in a common plane defined by steering column 6 axis and longitudinally axis. Steering column 6 axis is parallel to the steering handle. Longitudinal axis is taken longitudinally of the scooter chassis and is normal to the turning axis of the front steered wheel 4 when the front wheel steers in the forward direction. Front wheel 4 uses a disk braking system, however any system could be employed for retarding the rotation of the front wheel, or back wheel such as caliber, drum, or V-brakes. Main structural tube 2 extends through the standing platform 12 at the platform notch. Therefore as seen in FIG. 1 main structural tube 2 extends along the bottom of the standing platform 12 to facilitate fastening of standing platform 12, forward platform bracket 14a and rear platform bracket 14b securely mount standing platform 12 to main structural tube. From the vicinity of the rear platform bracket, the main structural tube 2 terminates in a horizontal pivot. A rear drive wheel 5 is supported to the tubular frame 2 adjacent to the

rearward end thereof, such as by means of a box 3, the lower end of which is open, the sides of the box extending down to form a yoke to rotatably receive the drive wheel secured to the frame member 3 adjacent to the rearward end of the frame thereof is an engine 8, preferably a gasoline engine which can either be a two or four cycle. A fuel tank 13 is located opposite the motor on box 3 Fig.6 the engine 8 is operationally coupled via a drive roller 22 supported by bearings 21a and 21b to the rear tire. A clutch 23 may be employed between the engine and the drive system. In figure 1, the forward frame 2 is connected to the rear half 3 of the frame by a pivot 9. Fig.2A One end of a shock absorbing device 1 is attached to the forward frame 2 by bracket 11. A notch is provided in the standing platform 12 for clearance for this bracket. The other end of the shock absorbing device is connected to the rear frame half 3 by a bracket 10.

Fig. 2A,2B,2C Bracket 10 or 11 can have multiple holes spaced apart from each other for receiving the shock absorbing device 1 ends. Fig. 1 and Figure 4 show a handle arrangement of the motorized suspension scooter. In Fig. 1, a handle member 6 in the form of an elongated tubular member, is shown in upright position as used in operating the suspension motor scooter. At the upper end of the handle is a horizontal handlebar having hand grips such as made of rubber or plastic on each end thereof. Inside of the hand grips are the controls for the acceleration and braking of the suspension motor scooter. The claims and the specifications describe the invention presented and the terms that are employed in the claims draw their meaning from the use of such terms in the specification. The same terms employed in the prior art may be broader in meaning than specifically employed herein. Whenever there is a question between the broader definition of such terms used in the prior art and the more specific use of the terms herein, the more specific meaning is meant. While the invention has been described

with a certain degree of particularity it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of this disclosure. It is understood that the inventions not limited to the embodiments set forth herein for purposes of exemplification's, but is to be limited only by the scope of the attached claim or claims, including the full range of equivalency to which each element thereof is entitled.

### **Summary of the Invention**

An all terrain suspension scooter is provided with a large central tubular chassis having two central brackets supporting a platform. At the front of the tubular chassis bends upward through a notch in the platform upward above the front wheel to support a steering head tube. The steering head tube supports a fork which holds the front wheels. The rear wheel is contained in a supporting bracket which also holds the engine relative to the rear wheel allowing it to be operatively connected, possibly the bracket supports the fuel tank. The central tubular member is pivoted somewhere along its' length so that that the frame halves can rotate in respect to each other along the pivot line. Rotation between frame halves is resisted by a shock absorber with either end mounted to respective frame halves. When driving over uneven terrain, the weight of the rider forces down upon the rider's platform which is connected to one or the other halves of the frame. Subsequently the frame halves pivot allowing the platform a downward motion which is absorbed by the shock absorber which is connected to the two frame halves, this suspension system allows the user to transverse uneven terrain with greater comfort, control and safety.